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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Russell H. Barton

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EXAMINER

PARSONS, THOMAS H

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 04/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/811,791	Applicant(s) BARTON ET AL.	
	Examiner Thomas H. Parsons	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: **reference sign “30” as included in Figure 1**. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

Page 1, line 10, suggest changing “can” to --and--; and,

Page 2, line 13, after “2002/0110713”, suggest inserting --(now U.S. Patent No. 6,852,343--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-8 and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herron (6,242,120) in view of GB2210977.

Claim 1: Herron in Figure 1 discloses a fuel cell assembly (12) comprising:

at least one fuel cell (14) comprising:

an anode (16) and a cathode (18), each having an inlet and an exhaust;

an electrolyte (20) interposed between the anode and the cathode;

a fuel passage (24) in fluid communication with the anode for directing a fuel stream to and from the anode; and

an oxidant passage (26) in fluid communication with the cathode for directing an oxidant stream to and from the cathode; and

a gas sensor (42) operably associated with the fuel passage for measuring the concentration of hydrogen gas in the fuel stream (i.e. for measuring the hydrogen consumption in the gas fuel stream). See col. 2: 57-col. 3: 11, col. 3: 51-55, and col. 4: 8-12.

Herron does not disclose that the gas sensor comprises a sound generator and a sound detector.

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GB 2 210 977 in Figure 1 discloses a sensor comprising a sound generator and a sound detector (1, 2)(abstract, page 1, last paragraph, page 2, paragraphs 2 and 3, page 3, lines 1-5, and page 4, line 17 through page 6, line 5).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the gas sensor with the gas sensor of GB '977 because GB '977 teaches a gas sensor that would have provided a more accurate indication of gas concentration thereby providing a means for improving the overall efficiency of the fuel cell system.

Claim 2: GB '977 further discloses that the sound generator is a transducer (1, 2) (page 4, line 17 through page 6, line 5).

Claim 3: GB '977 further discloses the same type of transducers (i.e. ultrasonic transducers) as those instantly disclosed. Therefore, the transducers of GB '977 would obviously encompass the claimed piezoelectric transducer.

Claim 4: GB '977 further discloses that the sound detector is a transducer (1, 2) (page 4, line 17 through page 6, line 5).

Claim 5: GB '977 further discloses the same type of transducers (i.e. ultrasonic transducers) as those instantly disclosed. Therefore, the transducers of GB '977 would obviously encompass the claimed piezoelectric transducer.

Claim 6: The rejection of claim 6 is as set forth above in claim 2.

Claim 7: GB '977 in Figure 1 further discloses that the gas sensor further comprises a temperature sensor (10) (page 4, line 17 through page 6, line 5).

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Claim 8: Herron in Figure 1 discloses that the assembly of claim 1 wherein the gas sensor (42) is associated with the anode exhaust passage (16).

Claim 13: Herron in Figure 1 discloses a method of operating an electrochemical fuel cell system (12) having an anode (16) and a cathode (18), the method comprising:

directing an oxidant stream (26) to and from the cathode;

directing a hydrogen stream (24) to and from the anode;

determining the concentration of hydrogen in the hydrogen stream (via sensor 42 and controller 46) col. 2: 57-col. 3: 11, col. 3: 51-55, and col. 4: 8-12.

Herron does not disclose generating a sound in the fuel stream passage; measuring an acoustic property of the sound; and calculating the hydrogen concentration based on the measured acoustic property.

GB '977 in Figure 1 discloses determining the concentration of hydrogen in the hydrogen stream by generating a sound in the fuel stream passage; measuring an acoustic property of the sound; and calculating the hydrogen concentration based on the measured acoustic property (abstract, page 1, last paragraph, page 2, paragraphs 2 and 3, page 3, lines 1-5, and page 4, line 17 through page 6, line 5).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the gas sensor with the gas sensor of GB '977 because GB '977 teaches a gas sensor that would have provided a more accurate indication of gas concentration by determining the concentration of hydrogen in the hydrogen stream by generating a sound in the fuel stream passage; measuring an acoustic property of the sound; and

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calculating the hydrogen concentration based on the measured acoustic property thereby providing a means for improving the overall efficiency and operating of the fuel cell system.

Claim 14: GB '977 further discloses that the acoustic property is the speed of sound (velocity) (abstract, page 1, last paragraph, page 2, paragraphs 2 and 3, page 3, lines 1-5, and page 4, line 17 through page 6, line 5).

Claim 15: GB '977 further discloses that the acoustic property is the frequency of sound (i.e. a continuously generated wave which is that same property as that instantly disclosed as a frequency of sound) (abstract, page 1, last paragraph, page 2, paragraphs 2 and 3, page 3, lines 1-5, and page 4, line 17 through page 6, line 5).

Claim 16: The Herron combination as set forth above in claim 13 provides the acoustically determining step in the anode exhaust.

5. Claims 9-12 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herron in view of GB2210977 as applied to claim 1 above, and further in view of Frank et al. (6,541,141).

Herron and GB '977 are as applied, argued, and disclosed above, and incorporated herein.

Claim 9: The Herron combination does not disclose a recirculating fuel line for directing the fuel stream from the anode exhaust back to the anode inlet.

Frank et al. in Figure 3 discloses a recirculating fuel line for directing the fuel stream from the anode exhaust back to the anode inlet. In Figure 3, the recirculating line is shown as 44→54→52→50→46→44)(col. 6: 29-col. 8: 13).

Claim 10: The Herron combination does not disclose a purge valve for directing the fuel stream to either the recirculating fuel line or the external atmosphere.

Frank et al. in Figure 3 disclose a purge valve (56, 60) for directing the fuel stream to either the recirculating fuel line or the external atmosphere (col. 6: 29-col. 8: 13).

Claim 11: The Herron combination does not disclose a liquid separator in the recirculating fuel line.

Frank et al. in Figure 3 disclose a liquid separator (50) in the recirculating fuel line (col. 6: 29-col. 8: 13).

Claim 12: The Herron combination does not disclose a recirculation device in the recirculating fuel line.

Frank et al. in Figure 3 disclose a recirculation device (52, 54) in the recirculating fuel line (col. 6: 29-col. 8: 13).

Claim 17: Herron in Figure 1 discloses that the method further comprising purging the anode exhaust when the measured hydrogen concentration (i.e. hydrogen consumption) falls below a predetermined threshold (col. 4: 28-col. 5: 9).

However, the Herron combination does not disclose a recirculating fuel line.

Frank et al. in Figure 3 disclose a recirculation device (52, 54) in the recirculating fuel line (col. 6: 29-col. 8: 13).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell assembly of the Herron combination by incorporating the recirculating line, the purge valve, the liquid separator, and the recirculation device of Frank et al. because Frank et al. teach a recirculating line, a purge valve, a liquid

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separator, and a recirculation device that would have provided water available to humidify in coming flows to the fuel cell without providing an outside source of water, discharged streams containing reduced levels of humidity, ensured that there is not problem with moisture and the vented gas tending to form frost and ice particles and build up on or around the apparatus thereby improving the overall cost associated with providing an outside source of water, operating and maintenance costs associated with a freezing apparatus, and overall performance of the fuel cell assembly.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by GB 2 210 977.

Claim 18: GB '977 in Figure 1 discloses a method of determining the concentration of hydrogen in a hydrogen gas line (3), the method comprising:

generating a sound in the hydrogen gas line;

measuring an acoustic property of the sound; and

calculating the hydrogen concentration based on the measured acoustic property. See abstract, page 1, last paragraph, page 2, paragraphs 2 and 3, page 3, lines 1-5, and page 4, line 17 through page 6, line 5.

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Claim 19: GB '977 further discloses that the acoustic property is the speed of sound (velocity).

Claim 20: GB '977 further discloses that the acoustic property is the frequency of sound (i.e. a continuously generated wave which is that same property as that instantly disclosed as a frequency of sound).

8. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB '977 as applied to claim 18 above, and further in view of Herron.

GB '977 is as applied, argued, and disclosed above, and incorporated herein.

Claim 21: GB '977 does not disclose a hydrogen gas line in an electrochemical fuel cell.

Herron in Figure 1 discloses a hydrogen gas line in an electrochemical fuel cell (col. 2: 57-col. 3: 11, col. 3: 51-55, and col. 4: 8-12).

Claim 22: GB '977 does not disclose that the hydrogen gas line is the anode exhaust of the electrochemical fuel cell.

Herron in Figure 1 discloses that the hydrogen gas line is the anode exhaust of the electrochemical fuel cell (col. 2: 57-col. 3: 11, col. 3: 51-55, and col. 4: 8-12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of GB'977 by incorporating the hydrogen gas line of Herron because both are concerned with sensing hydrogen in a gas line and Herron et al. teach a hydrogen gas line that would have provided source of gas requiring an more accurate indication gas concentration thereby providing a means for improving the overall efficiency and operating of the fuel cell system.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas H. Parsons whose telephone number is (571) 272-1290. The examiner can normally be reached on M-F (7:00-4:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER

Thomas H Parsons
Examiner
Art Unit 1745
